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THE TANGIER PEA

Lathyrus tingitanus

BY P. B. KENNEDY

Courtesy of F. G. Cuthbertson.

A crop of Tangier peas in full blossom at the Molera Ranch near Castroville, Monterey County, California.

INTRODUCTION

The following statement by such an eminent authority on economic plants as C. V. Piper[1] of the United States Department of Agriculture is sufficient encouragement to report the results of observations and experiments with the Tangier pea in California.

"It has given the largest yields of green matter to the acre of any annual legume grown in California. The dense growth chokes out weeds completely. It is a good green manure crop but the seed has been hard to get. There is hope that this difficulty may be overcome."

Recent observations and experiments show that large yields of seed of excellent quality can be grown in California.

The Tangier pea is an annual indigenous to northern Africa. It has long been known in European gardens as an ornamental plant and was first grown and recommended as a winter forage plant by Dr. Trabut of Algeria. The earliest record I can find of its introduction into the United States is given by C. R. Ball[2] in 1900.

"Chicharaca (*Lathyrus tingitanus* L.)—Plat 9–D–13 was seeded on May 28 with seed from Algeria (S. P. I. No. 3289). Only a thin stand was secured, but the growth was very rapid. The plants were unaffected by the heat and drought and reached a length of from 3 to 4 feet by the end of the season. They produced numerous flowers during July, but no seeds set and the pods did not develop. On November 15 the plants were still green and healthy in spite of several severe frosts. This species closely resembles the bitter flat pea, but grew much larger. It has not heretofore been cultivated in this country. It was introduced from Algeria, where it is used as a winter forage, and is said to be free from the poisonous properties found in so many of the flat peas. It is cultivated also in the Canary Islands and Morocco, and is said to be hardy in southern France where exposed to a temperature of 26 degrees F."

Since the time of this first trial at Washington, D. C., numerous experiments have been conducted by the United States Department of Agriculture and the Agricultural Experiment Stations. Necessary repeated experiments were usually prevented because of the loss of the seed by shattering. The Seed and Plant Introduction numbers of *Lathyrus tingitanus* grown by the California Station from 1900 to 1905 were 5585, 7637, and 21607. One lot designated 50/01 E 1x3 and received from Vilmorin and Company, Paris, under the name *L. japonicus* proved to be *L. tingitanus*. A variety with one flower on the peduncle, *L. tingitanus uniflora* (5/02 E VII.2) has also been grown.

[1] Piper, C. V., and Pieters, A. J., Green manuring. U. S. Dept. Agr., Farmers' Bull 1250:42, 1922.

[2] Ball, C. R., Grasses and Fodder Plants on the Potomac Flats. U. S. Dept. Agr., Div. Agrost., Cir. 28:14, 1900.

Courtesy of P. A. Ingvason.

Fig. 1.—Tangier peas grown under irrigation as a green manure crop on Giffen Ranch near Fresno, California.

Sornay[3] (p. 284) says:

"It is a first-class fodder plant and thrives very well. It is sown at the beginning of the rains and its stems rapidly cover the soil. Cattle eat it readily. Attempts should be made to acclimatize this legume in various sub-tropical countries."

He errs in stating that *Lathyrus tingitanus* "grows wild in North America." It is indigenous to Algeria.

Courtesy of U. S. D. A.

Fig. 2.—The roots of Tangier pea are well supplied with nodules.

Mr. W. E. Barker of Sequim, Washington, writes that on January 17, 1923, he

"grew the Tangier pea on the poorest pieces of land on the farm; land that had been cropped to wheat for fifty years. It grew about 7 feet high and made an impenetrable jungle. We harvested with a mower. I think this year I will try

[3] Sornay, P. de, Green manures and manuring in the tropics. English translation by F. W. Flattely, 1916.)

tying a rope to the end of the sickle bar and have a man jerk the cut stuff away from the standing. I know this is practised with a heavy vetch crop. I will have about two acres in this year and I know of another acre field in Oregon. I gave a lot of seed away here to other vetch growers and there should be quite a quantity grown here in a year or two. It does not shell out here in the slightest, which seems to be the main trouble in Oregon. The air here at harvest time is very moist.''

Similar reports have been received from Alabama, Oregon and California, so that it would seem that the Tangier pea is destined to find a useful place as a green manure (fig. 1) and as a forage crop not only in California but throughout a wide range of territory in the United States and elsewhere. As a spring sown crop it is favorably mentioned in North Dakota and Indiana.

DESCRIPTION OF THE PLANT

The Tangier pea (see fig. 3) is an annual leguminous plant resembling in a general way the ornamental sweet pea of the gardens. It is a strong grower with numerous large nodules on its roots (fig. 2). The plants grow from 3 to 7 feet long in a tangled mass (fig. 1), producing a dense covering on the ground which enables it to choke out weeds. It does not grow during the cold weather, but it shows the effects of frost less than field peas, sweet clovers, vetches and other winter legumes. The plant is smooth throughout, with coarse stems and prominent stipules. The leaves consist of a pair of large leaflets and a much branched tendril terminating the midrib of the leaf. From the axils arise stalks which bear 2–3 flowered clusters of bright scarlet flowers which are about the size of small sweet pea blossoms. The pods are about 3¼ inches long and contain about seven seeds. The seeds (fig. 4) are brown, elliptical, somewhat flattened and about ¼ of an inch long. The hilum or scar is whitish and ⅛ of an inch long.

RELATED SPECIES

The genus *Lathyrus* is represented by about 100 species occurring chiefly in the northern hemisphere with a few in the mountains of tropical Africa and some in South America. They resemble the vetches of the genus *Vicia* so closely that only botanists are able to distinguish one from the other. Those that everyone is familiar with are the annual ornamental sweet pea, *Lathyrus odoratus* and the perennial everlasting sweet pea, *L. latifolius* of the gardens.

The grass pea, *Lathyrus sativus,* known also as Swiss pea, wedge pea, mission pea and chickling vetch, is an annual plant and makes an excellent winter growth. It is less subject to attack by aphis than the vetches, *Vicia,* and is strongly resistant to the pea weevil. It is recommended for use in Canada in districts where

Courtesy of U.S. D. A.

Fig. 3.—Upper portion of Tangier pea, showing leaves, stipules, flowers and pods.

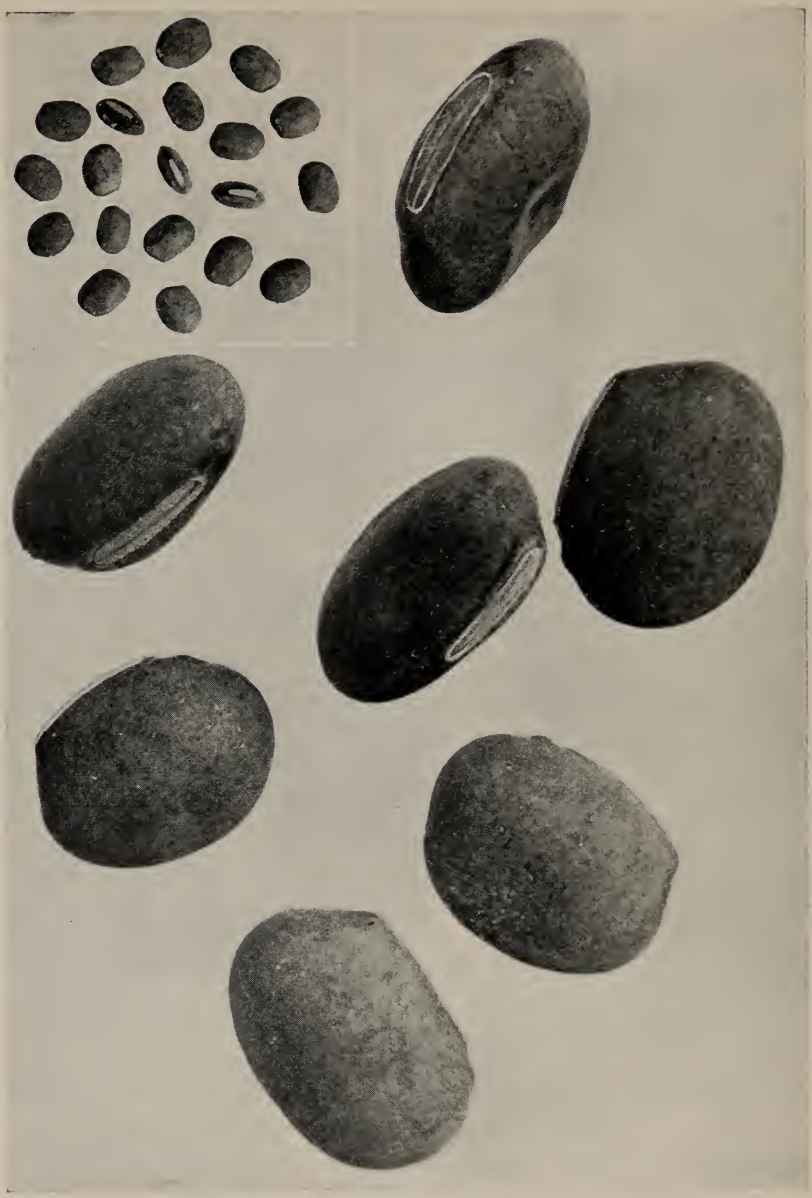

Fig. 4.—Seeds of the Tangier pea, natural size and enlarged five times.

the ordinary field pea, *Pisum*, cannot be grown on account of the ravages of the pea weevil. The leafage makes good forage and the seed which is produced abundantly, is used as human food especially in the Sudan, Roumania and other parts of Europe. Mr. A. F. Etters of Ettersburg, Humboldt County, California, reports a yield of 2600 pounds of seed to the acre. The late Mr. L. R. Whiteside, of Willow Creek, Humboldt County, states in a letter that the grass pea is not bothered with pea weevil, that it is good hog feed, and that the seed does not shatter readily. He recommends feeding it to laying hens and also considers it superior to any dry pea for human food. In experiments at the various stations it has been found that the tonnage of green material to the acre is very much less than that of the Tangier pea. Seed of the grass pea is occasionally offered for sale by the seedsmen of California.

The flat pea, *Lathyrus silvestris*, particularly the improved strain, Wagner's flat pea, is a perennial offered for sale by seedsmen in Europe, Canada and the eastern United States. It is said to grow successfully on poor land, even if sandy. Owing to its deep root system, it is very resistant to drought. The crop has been recommended for pasture and for hay. It has a high nutritive value, but authorities disagree in regard to its palatability. Trials at the California Experiment Station for many years have not been sufficiently promising to justify its recommendation as a crop for this state.

In addition to the above mentioned, twelve other exotic species of *Lathyrus* have been grown in our legume experimental gardens. With the exceptions of the French pea, *L. clymenum*, and the ochrus pea, *L. ochrus*, none of them have, as yet, given sufficient promise in the preliminary trials to be considered for forage, green manure or seed.

In California there are at least a dozen indigenous species, some of which are important range plants and others ornamental. The most interesting is what is known as the Pride of California, *Lathyrus splendens*, with large, showy deep rose purple flowers. Traveling on the highway between San Diego and Imperial Valley one is much impressed by the gorgeous display produced by this plant as it climbs through and over the chaparral.

Another, Torrey's wild pea, *Lathyrus torreyi*, occurs in patches in the Sierra Nevada Mountains. It looks not unlike alfalfa and has creeping rootstocks. Other native species are found in the marshes, by the sea shore and on the banks in partial shade on the coast hills. Everywhere they are grazed to a greater or less extent, but no experiments have been carried on to determine their value under cultivation.

THE SEED CROP

Tangier peas have given excellent results in the southern United States and in California and the chief objection to their general introduction as a forage and green manure crop has been the difficulty of producing the seed cheaply enough to compete with the vetches (*Vicia*).

The seed shatters (fig. 5) readily from the pods when mature if exposed to the hot sun in an arid atmosphere. This difficulty has been very largely overcome by growing the crop in the fog belt and harvesting the seed when the pods are ripe, but moist from the fog.

Commercial quantities of the seed are now available, largely through the efforts of Mr. P. A. Ingvason, who contracted with Mr. J. E. Phillips to grow a seed crop on the Molera ranch, 2½ miles from Castroville, Monterey County, California. The crop was grown on bottom land near the ocean on which sugar beets had been grown for many years.

Fig. 5.—Pods of Tangier pea before and after expulsion of the seeds.

For seed production the method of seeding is to plant the seed in rows three and a half feet apart in the fall after the first rains. The time of planting will vary with the seasonal variations, but is usually in November or December. The rate of seeding is about 25 pounds to the acre. Owing to the prevailing cold winds from the ocean, the growth is slow until spring, when it makes a very rapid growth

reaching a height of from 5 to 7 feet by the end of July, when growth ceases. At this time the vines are so heavily laden with pods (fig. 6) throughout their length that a settling (fig. 7) to 5 or 6 feet in height takes place and the vines turn brown and are ready for harvest from the first to the middle of August.

HARVESTING THE SEED

The tangled growth is so large and dense that difficulties are encountered in cutting the material in such a manner as to be readily available for threshing. The method has been to cut the material at the base near the ground with a mower and to roll the cut portion (fig. 8) out of the way of the next cut, by hand. It is then bunched and hauled to the thresher (fig. 9). The atmosphere during the harvesting process should be quite moist so as to reduce the shattering (fig. 5) of the seed to a minimum.

A method sometimes advocated for heavy crops of vetch is to tie a rope to the end of the sickle bar and have a man jerk the cut material away from the standing. No doubt other methods and machinery could be devised that would reduce the labor cost very considerably.

No trouble is encountered in separating the seed from the pods and straw by any ordinary bean or pea threshing machine and as there are no weeds, a fine quality of seed is produced that needs little or no additional cleaning. One ton of seed to the acre may be expected and two or more tons to the acre have been produced. The seed weighs 60 pounds to the bushel.

There is every reason to believe that, as the conditions for growing the seed exist over a wide area on the coasts of California, Oregon and Washington, the Tangier pea will soon find a permanent place in American agriculture.

A very large tonnage of straw remains after threshing. That it is valuable as a fertilizer may be gathered from the following analysis furnished by the Division of Nutrition of the College of Agriculture.

Analysis of Tangier Pea Straw

Moisture	Protein	Fat	Ash	Fiber	N.F.E.
10.00%	6.42%	1.78%	10.64%	37.10%	34.06%

Average of Analyses of Sixteen Kinds of Bean Straw[4]

Moisture	Protein	Fat	Ash	Fiber	N.E.F.
11.07%	5.68%	1.52%	6.97%	41.10%	33.63%

[4] Hendry, G. W., et al., Bean culture in California. California Agr. Exp. Sta., Bull. 294:343, 1918.

Fig. 6.—A dense growth of Tangier peas six feet tall, heavily laden with pods and ready to harvest. All weed growth has been effectually smothered.

Fig. 7.—A mature seed crop of Tangier pea ready to harvest. Molera Ranch, near Castroville, Monterey County, California.

A comparison of the analyses indicates that Tangier pea straw has about the same value as an organic fertilizer as the average bean straw now utilized in the orchards of southern California. As the Tangier pea can be grown for seed on the same land now growing commercial crops of sugar beets, potatoes, mustard seed and other crops, it would seem advisable to spread the straw on the land where it is grown, and plow it under as a fertilizer. It might also be found valuable in the orchards of the Santa Clara Valley and other fruit sections in the vicinity.

THE TANGIER PEA FOR GREEN MANURE

The large and abundant nodules (fig. 2) on the roots of the Tangier pea make it an excellent nitrogen gatherer. Its ability to withstand cold and frost without permanent injury is also in its favor as a winter grower.

The chief aim in growing a green manure crop is to produce as large a tonnage as possible of green material, preferably of a leguminous crop, that can be plowed under and incorporated with the soil. Tangier peas produce a heavy tonnage. Mertz[5] shows that a five year average tonnage on light sandy loam under irrigation at the Rubidoux Experiment Farm, Riverside, California, was 13.7 tons to the acre, the same as that of bitter clover (*Melilotus indica*). The only legume producing a greater tonnage was purple vetch (*Vicia atropurpurea*) with 20 tons to the acre, but this was for a two-year period only, and therefore not strictly comparable. The average of nine different kinds of legumes was 13.0 tons to the acre.

The question of whether this or that legume is the "best" can be determined only by a series of experiments over a long period of years. No single legume gives equally good results every year in a given district. One year the small seeded horse bean will make a four foot growth by January first, and the next year only a foot of growth will be produced because of the ravages of aphis. Bitter clover makes a very poor growth in cool, dry winters, as in the season of 1924–25, when it was only four inches high by the middle of January. Purple vetch is one of the best of the new legumes, but it is severely attacked by aphis in certain seasons.

Another feature not sufficiently considered in the growing of crops in general is that nearly all crops are subject to certain diseases and insect pests so that by changing the host plant the breeding grounds are frequently interfered with.

[5] Mertz, W. M., Green manure crops in southern California. California Agr. Exp. Sta., Bull. 292:10, tab. 2, 1918.

Fig. 8.—A field of Tangier peas being harvested for seed on Molera Ranch, near Castroville, Monterey County, California.

Fig. 9.—A seed crop of Tangier peas bunched and ready to haul to the thresher, Molera Ranch, near Castroville, Monterey County, California.

All of the above mentioned legumes will make a satisfactory green manure crop in certain seasons, but the same legume will in no case make the most satisfactory crop every year. It is safest, therefore, to rotate the best known leguminous green manure crops for a ten-year period. The following is a suggestion for a ten-year rotation:

Bitter clover (*Melilotus indica*), two years.
Purple vetch (*Vicia atropurpurea*), two years.
Tangier pea (*Lathyrus tingitanus*), two years.
Small seeded horse bean (*Vicia faba* var. *minor*), two years.
Fenugreek (*Trigonella foenum graecum*), two years.

It may be found after further experimentation that in certain districts one or more of these legumes may be supplanted in the rotation by other varieties. Some very promising winter growing legumes now under experiment are the spurred vetch (*Vicia calcarata*), the one flowered vetch (*Vicia monanthos*), and species of lupines. It seems probable that when a more complete knowledge of the growth requirements for each legume is available that a definite mixture of seed of a number of different legumes will be found to produce the largest average tonnage of green stuff to plow under over a period of years, and make it practically certain that a good cover crop will be produced every year, notwithstanding the seasonal variations.

In the early experiments of the California Experiment Station on small trial plots from 1900 to 1905, with irrigation, a yield estimated at from 17 to 19 tons of green tops to the acre was produced by April 20 from October seeding in southern California. Without irrigation and with a rainfall of less than 10 inches the results were not promising and in very dry years the crop was a complete failure. One instance is recorded from Redlands where, on red clay loam with the seed broadcasted between the rows of an orange orchard on October 7, 1905, and with ample irrigation, an estimated yield of 35 tons to the acre of green stuff is reported by April 4, 1906.

THE TANGIER PEA AS A FORAGE PLANT

The experiments that have been conducted with the Tangier pea have been mainly in regard to its use as a green manure. Yet it is highly regarded by Trabut in Algeria and by some of the experiment stations in the United States as a forage plant. The leafage is both palatable and nutritious and no deleterious effects have been recorded from feeding it to livestock. At Vacaville, Solano County, California,

on alluvial deposit soil verging on adobe, without irrigation, an estimated yield of three tons of hay to the acre was obtained. The seed was planted on November 17 and harvested May 1. It received a seasonal rainfall of 17.29 inches with a minimum temperature of 30 degrees F.

At San Lorenzo, Alameda County, California, on alluvial deposit soil, from seed sown October 30 and grown without irrigation a growth five feet in height was obtained by April 23. The temperature dropped to 26° F. in February, but the crop was only slightly injured, and later recovered. Under especially favorable circumstances estimated yields of as high as nine tons to the acre have been reported in California. As it has been shown that a dense crop seven feet in height can be grown without irrigation and under field conditions, it is plain that the Tangier pea should be given a thorough and extended trial for forage purposes in all the coast counties of California from the Monterey Bay region (frontispiece) north to the Oregon boundary line.

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